

09/857650
531 Rec'd PCT/F 07 JUN 2001

CLEAN VERSION OF PAGES 2 AND 2A OF SPECIFICATION

09857650-101201

- 2 - 531 Rec'd PCT.

09/857650

07 JUN 2001

lactulose by simultaneous stirring and heating of a lactulose solution to reduce its water content and introduction of seed crystals until a free-flowing powder is obtained. A disadvantage of this method is that it needs to be carried out in batches and is not suitable for commercial scale production. Additionally, there is the need to introduce seed crystals and these crystals may contaminate or be different from the content of the lactulose solution, as well as introducing a further step into the process.

US Patent 5415695 describes a further method of preparing solid forms of lactulose by evaporating lactulose syrup to reduce its water content and then cooling the evaporated syrup until it solidifies. The solidified product can then be milled into powder. The method is preferably carried out with very rapid cooling of the lactulose solution. This often results in a product that needs extensive milling or other processing to obtain a uniform powder. Further, it is not possible to carry out this process in a continuous fashion.

A still further process for manufacturing solid lactulose preparations is described in WO 98/19684. An aqueous lactulose solution is spray-dried in a countercurrent of air into a fluidised bed container. However, to obtain reliable output of dried lactulose it is generally necessary for a swelling or gelling agent to be included to absorb water from the lactulose solution. As previously mentioned, the presence of any such agent is highly undesirable in pharmaceutical preparations containing lactulose.

- 2A -

JP49-54556 describes a method for drying lactulose syrup in a shelf-type freeze dryer at temperatures of $>-45^{\circ}\text{C}$ under reduced pressure. In this process, a batch of lactulose is spread onto a tray, freeze-dried to 80-85% solids, and then warmed gradually to form a foam, which is dried under reduced pressure at a temperature of 80°C for 4 hours, followed by a temperature of 35°C for 18 hours. This process requires long drying times and is only suitable as a batch operation.

It is an object of the present invention to provide an alternative method for drying of lactulose solutions so as to obtain a powdered form of lactulose.

It is a further object of the present invention to provide a method of drying lactulose which does not require the presence of agents such as swelling or drying agents or seed crystals.

Accordingly, a first aspect of the present invention provides a method of